

BOKADE et al. – Appln. No. 10/620,813

**IN THE DRAWINGS**

Kindly enter the attached replacement drawings. The informalities objected to by the Official Draftsperson are corrected.

### REMARKS

Reconsideration and allowance are respectfully requested.

Claims 1-29 are pending. The claim amendments are fully supported by the original disclosure and, thus, no new matter is added by their entry. Typographical errors are corrected in claims 1, 5 and 16.

The Official Draftsperson objected to the drawings in PTO-948. The informalities noted in the Notice are corrected in the attached.

#### *35 U.S.C. 112 – Definiteness*

Claims 1-29 were rejected under Section 112, second paragraph, as being allegedly "indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention." Applicants traverse.

The polymeric membrane functions to separate the unreacted reactants and the product stream, which would be understood from "catalytic membrane reactor" (CMR) by one of ordinary skill in the art. This is made explicit by amending claim 1. Inferences drawn from the examples and advantages of CMR are discussed on pages 10-11 of the specification. The product (i.e., cumene) is removed continuously, shifts the reaction equilibrium in the forward direction, and avoids byproduct formation by ensuring the product is not available for further reactions (see page 11, lines 16-19). Separation is inherent in the process performed in the CMR, other separation steps are eliminated or minimized by removal of the product through the membrane (see page 11, lines 30-31).

The "inert packing material" and the "polymeric membrane" are different, and this would be understood by one of ordinary skill in the art. See Figs. 1-2, wherein the inert packing material (3) and the membrane (6) are shown. They can also be made from different materials as clearly described on page 4, lines 25-32, of the specification.

The polymeric membrane (6) is coated on the inside of the concentric radial type reactor (see Fig. 2). Claims 7 and 23 are amended to clarify this feature.

Applicants request withdrawal of the Section 112, second paragraph, rejection because the pending claims are clear and definite.

*35 U.S.C. 103 – Nonobviousness*

To establish a case of prima facie obviousness, all of the claim limitations must be taught or suggested by the prior art. See M.P.E.P. § 2143.03. Obviousness can only be established by combining or modifying the prior art teachings to produce the claimed invention if there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to a person of ordinary skill in the art. See, e.g., *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Jones*, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992). It is well established that the mere fact that references can be combined does not render the resultant combination obvious unless the desirability of that combination is also taught or suggested by the prior art. See *In re Mills*, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990). Thus, even if all elements of the claimed invention were known, this is not sufficient by itself to establish a prima facie case of obviousness without some evidence that one would have been motivated to combine those teachings in the manner proposed by the Examiner. See *Ex parte Levengood*, 28 USPQ2d 1300, 1302 (B.P.A.I. 1993).

Evidence of the teaching, suggestion or motivation to combine or to modify references may come explicitly from statements in the prior art, the knowledge of a person of ordinary skill in the art or the nature of the problem to be solved, or may be implicit from the prior art as a whole rather than expressly stated in a reference. See *In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999); *In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). Rigorous application of this requirement is the best defense against the subtle, but powerful, attraction of an obviousness analysis based on hindsight. See *Dembiczak* at 1617. Whether shown explicitly or implicitly, however, broad conclusory statements standing alone are not evidence because the showing must be clear and particular. See *id.*

Claims 17, 19-20 and 23-29 were rejected under Section 103(a) as allegedly unpatentable over Haag et al. (U.S. Patent 5,100,596; hereinafter the '596 patent) in view of Sakuth et al. (WO 01/62692; hereinafter the WO document). Applicants traverse.

Firstly, there is no disclosure of a catalytic membrane reactor provided with a polymeric membrane in the portions of the '596 patent cited on page 3 of the Action. A significant difference between the membrane of the '596 patent and that of Applicants' invention is that the '596 patent's membrane is a synthetic noncomposited, microporous membrane comprising a continuous array of crystalline molecular sieve material (col. 2, ls. 15-65). The '596 patent's membrane is self supporting, capable of carrying out molecular sieving action, and composed only of a zeolite phase (see col. 2, ls. 5-11). Thus, while Applicants' membrane is polymeric and may (or may not) include zeolite (i.e., a composite membrane), the '596 patent's membrane is a porous sheet-like structure of pure zeolite (see col. 2, l. 64, to col. 3, l. 5).

In its Background of the Invention section, the '596 patent lists polymeric filters containing dispersed particles of zeolites (i.e., composite membranes). But neither polymeric filters nor polymeric supports are taught or suggested for use with the non-composited membranes of the '596 patent. In contrast, the '596 patent discloses that composite membranes comprising a zeolite phase and polymeric materials suffer from disadvantages in terms of their separation properties (cf. col. 1, ls. 29-40, with col. 2, ls. 5-11). The '596 patent actually teaches away from including polymeric material in its zeolite-containing membrane because the noncomposited membrane is composed of pure zeolite. Applicants' invention would include a polymer in the membrane and this would destroy the purity of zeolite in '596 patent's membrane and undesirably affect its separation properties.

There is also no teaching or suggestion in the '596 patent of the use of a catalytic membrane reactor for the preparation of cumene from reaction of benzene with isopropanol where the membrane is polymeric and under the reaction conditions of claim 17.

Furthermore, the WO document, which discloses the preparation of cumene, does not cure the defects found in the '596 patent because no catalytic membrane reactor is either taught or suggested.

Claim 18 was rejected under Section 103(a) as allegedly unpatentable over Haag et al. (U.S. Patent 5,100,596) in view of WO 01/62692, and further in view of Fehlner et al. (U.S. Patent 5,474,681; hereinafter the '681 patent). Applicants traverse.

The failure of the '596 patent and the WO document to disclose Applicants' invention is not remedied by the attempt to modify their disclosures with the '681 patent, which discloses use of silicone rubber. The '681 patent discloses using silicone rubber to obtain a zeolitic material which forms the catalytic membrane. It does not teach or suggest using silicone rubber as part of the membrane. The '681 patent clearly states that the silicone polymers are attacked by hydroxyl group to displace the alkyl groups from silicon atoms and to break the polymeric chains and yield inorganic membranes.

Claims 21-22 were rejected under Section 103(a) as allegedly unpatentable over Haag et al. (U.S. Patent 5,100,596) in view of WO 01/62692, Fehlner et al. (U.S. Patent 5,474,681), and Kawamura (U.S. Patent 5,932,104; hereinafter the '104 patent). Applicants traverse.

The failure of the '596 patent, the WO document, and the '681 patent to disclose Applicants' invention is not remedied by the attempt to modify their disclosures with the '104 patent, which discloses forming filtration membranes using oleophilic substances. There is no teaching or suggestion therein of the specific catalytically active membrane of Applicants' invention or its application to preparation of cumene from benzene. The '104 patent's membrane filters contaminated engine oils and is not used to separate a product (i.e., cumene) from unreacted reactants (i.e., benzene and isopropanol).

Additionally, the only relevant disclosure that is found to be shared between the '104 patent and Applicants' claimed invention is the use of silicone rubber to form the membrane. There is, however, no disclosure in the '104 patent of any catalytic activity. The '104 patent's membrane is a simple filter whose crosslinked matrices trap and gel the contaminants in engine oil. There is also no teaching or suggestion that the '104 patent's membrane can be used in a catalytic reactor. There is absolutely no reason to read the '104 patent with any or all of the other three documents because of the disparate technologies or any motivation to combine them because the former does not address any deficiency in the prior art of chemical synthesis.

Withdrawal of the Section 103 rejections is requested because the invention as claimed would not have been obvious to a person of ordinary skill in the art at the time it was made.

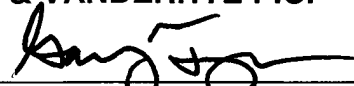
*Conclusion*

Having fully responded to all of the pending objections and rejections contained in this Office Action, Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The Examiner is invited to contact the undersigned if any further information is required.

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By: \_\_\_\_\_



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